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| (21) International Application Number: PCT/EP96/03264 (22) International Filing Date: 24 July 1996 (24.07.96) (30) Priority Data: VE95A000031 7 August 1995 (07.08.95) IT VE95A000050 23 November 1995 (23.11.95) IT (71) Applicant (for all designated States except US): MIDA S.R.L. [IT/IT]; Via Zanardelli, 99, I-73100 Lecce (IT). (72) Inventor; and (75) Inventor/Applicant (for US only): FLAMINIO, Mariaromano [IT/IT]; Viale Cicerone, 11, I-73020 Cavallino (IT). (74) Agent: PIOVESANA, Paolo; Corso del Popolo, 70, I-30172 Venezia Mestre (IT). | | (81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> |
| (54) Title: METHOD FOR COATING AND DECORATING SURFACES IN GENERAL (57) Abstract <p>A method for coating surfaces in general, and decorating them with powders of various colours characterised by: applying to the surface to be decorated, previously treated for this application, a layer of powdered coating material of colour corresponding to the desired background for the decoration to be obtained, heating the surface treated in this manner to a temperature lower than the baking temperature of the powdered coating material, but sufficient to fix it to the surface to be decorated, applying to the surface prepared in this manner at least one powder of colour corresponding to the coloured motif to be reproduced, distributing it in accordance with the desired pattern of this motif, subjecting the surface treated in this manner to final baking for a time and at a temperature sufficient to securely fix said powder to said surface.</p> | | |

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METHOD FOR COATING AND DECORATING SURFACES IN GENERAL

This invention relates to a method for coating surfaces in general and decorating them with powders of various colours.

The surfaces of natural materials, such as wood and marble, have an
5 outer appearance which is very pleasing to the view. These natural materials have however numerous drawbacks such as high cost, an increasingly more limited availability due to environmental problems and often poor resistance to atmospheric agents.

In addition marble has the added drawbacks of considerable weight, as
10 it can be formed only into slabs of a certain minimum thickness, and with only flat surfaces, unless further costly surface machining is undertaken.

To combine the aesthetic merits of these natural materials with low cost and a large variety of shapes and dimensions, it has already been proposed to decorate metal, plastic, ceramic and other surfaces to imitate
15 these natural materials.

A known method of decoration is photofilming, in which a powder or liquid coating forming the background colour is applied to the surface to be decorated, followed by the application thereon of a film reproducing the required decoration. This method has various drawbacks, including:

- 20 - high cost due both to the intrinsic cost of the materials and the cost of adapting a traditional coating plant,
- an unsatisfactory result from the aesthetic viewpoint due to the excessive uniformity of the decoration,

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- limited resistance to atmospheric agents.

Another known decoration method is to apply a PVC covering to the surface concerned, and in particular to form by traditional methods a PVC film reproducing the desired decorations, in imitation of wood or marble, and to
5 glue this film to the surface to be decorated.

This method has also proved unsatisfactory in that it also has numerous drawbacks, including:

- an aesthetic result which is not natural,
- a high final cost of the product obtained,
- 10 - limited resistance to atmospheric agents.

All these drawbacks are overcome by a method for coating and decorating with powders of various colours surfaces in general as described in claim 1.

A preferred embodiment of the present invention is described in
15 greater detail hereinafter with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a surface to be subjected to the treatment according to the invention;

Figure 2 shows it after the initial heating stage; and

20 Figure 3 shows it after final baking.

The method of the invention is applicable to any metal, ceramic, plastic, wood or glass surface to be decorated, in such a manner as to assume the typical appearance of a natural surface, such as wood or marble.

The surface 2 is firstly subjected to specific treatment depending on the nature of the surface to be decorated, but which in itself does not form part of the invention.

To the surface 2 treated in this manner there is then electrostatically applied a layer of powdered coating material 4, in particular of polyester, epoxy or epoxypolyester resins, of colour corresponding to the desired background colour for the decoration to be obtained. Polyester-hydroxyalkylamide resins, polyurethane resins, acrylic resins, epoxyacrylic resins, acrylopolymurethane resins or acrylopolymester resins can also be applied. After the powdered coating material 4 has been applied to the surface, it is heated to a temperature less than the baking temperature of said coating, but sufficient to cause it to fix to the surface to be decorated. Indicatively the heating temperature is about 75-90°C and can be achieved by providing, in a traditional powder coating line, pairs of catalytic heating panels, heating lamps, ultraviolet lamps, etc., between which the surface to be decorated is passed.

In the case of particular decorations for which one application stage and one heating stage for the coating layer are found to be insufficient, these two stages can be repeated.

After the heating stage, the purpose of which is to fix a layer of powdered coating material 4 to the surface to be decorated, a second powdered coating material 6 of colour corresponding to the coloured motif to be reproduced is applied to the surface prepared in this manner.

This second powdered coating material also preferably consists of the aforesaid resins.

The second powdered coating material 6 can be applied either as a suspension of the powder 6 in a slow-drying liquid vehicle, or can be applied
5 in the dry state. In the first case a liquid of slow evaporation or a slow-drying acrylic liquid is preferably used, the powdered coating material 6 being mixed into this liquid to form a suspension. The suspension is then spread over the surface to be decorated with automatic or manual applicators which arrange the powdered coating material 6 in the required decorative pattern. In
10 particular in reproducing the pattern of wood grains, because of the slow drying of the acrylic liquid, the decoration can also be modified by direct intervention of the operator, who can even produce the characteristic form of wood knots.

To solve special problems, intermediate treatments other than the
15 application of powders and their heating can be provided.

If the powdered coating material 6 is applied dry, its application can be by various methods.

A first method consists of applying to the surface to be decorated a uniform layer of powder 6 and then removing the excessive portion so as to
20 form the desired graining. This removal can be achieved either by suction or by a process of coordinated wiping by mechanically or manually operated tools, such as brushes, blades, pads, sponges etc.

In particular, a tool can consist of an automatic applicator formed from

a pair of cylindrical rotary pads with the surface worked according to the notif to be reproduced or rotary brushes sprayed with liquids and used for partially removing the excess quantity of powder, previously applied to the piece to be treated, to leave on its surface the particular decoration to be obtained.

5 A different method of applying the powder 6 is to use a sort of silkscreen stencil reproducing the required decorative pattern.

On termination of this stage, the entire assembly is baked, indicatively at 180°C for 20 minutes.

The result of this treatment is a surface having an outer appearance
10 totally similar to the surfaces of natural materials, but with decidedly better characteristics than those obtainable by traditional methods.

Coating tearing tests, chequering tests and acetic salt-spray tests were carried out on samples of surfaces obtained in this manner and gave positive results. In particular, these latter tests exceeded more than 1000 hours without
15 any formation of bubbles or blisters.

From the foregoing it is apparent that the method of the invention has numerous advantages, and in particular:

- it enables existing coating plants to be used, with only simple modifications,
- it achieves an aesthetically satisfying result to the extent of not revealing the
20 artificial nature of the support,
- it presents optimum resistance to atmospheric agents,
- it is of low cost because of the use of low-cost materials,
- it enables surfaces of any geometry and area to be decorated,

- it enables the surfaces of small-thickness and hence low-weight supports to be decorated.

The method of the invention can be used for forming a large number of products, including:

- 5 - metal section bars for window frames with a wooden or marble outer appearance,
- metal plates for household electrical appliances with a wooden or marble outer appearance,
- chipboard or MDF panels for kitchens with a wooden or marble outer
10 appearance,
- metal urban furniture elements with a wooden or marble outer appearance,
- metal sheets and section bars for use in the automobile, naval and aeronautical sectors.

It should be noted that in addition to the wooden or marble outer
15 appearance, other appearances are possible comprising multiple coloration.

C L A I M S

1. A method for coating surfaces in general, and decorating them with powders of various colour characterised by:
 - applying to the surface to be decorated, previously treated for this
 - 5 application, a layer of powdered coating material of colour corresponding to the desired background for the decoration to be obtained,
 - heating the surface treated in this manner to a temperature lower than the baking temperature of the powdered coating material, but sufficient to fix it to the surface to be decorated,
 - 10 - applying to the surface prepared in this manner at least one powder of colour corresponding to the coloured motif to be reproduced, distributing it in accordance with the desired pattern of this motif,
 - subjecting the surface treated in this manner to final baking for a time and at a temperature sufficient to securely fix said powder to said surface.
- 15 2. A method as claimed in claim 1, characterised in that before applying the powder of colour corresponding to the coloured motif to be reproduced, a further layer of powdered coating material corresponding to the desired background is applied and the surface treated in this manner is heated, said two stages being able to be repeated several times.
- 20 3. A method as claimed in claim 1, characterised in that the surface to be decorated is of metal, metal alloy, wood, glass, ceramic or plastic.
4. A method as claimed in claim 1, characterised by heating the surface to be decorated, covered with the layer of powdered coating material, to a

temperature of between 75 and 90°C.

5. A method as claimed in claim 1, characterised by passing the surface to be decorated, covered with the layer of powdered coating material, in front of a heat source provided in a powder coating line.
- 5 6. A method as claimed in claim 5, characterised by passing the surface to be decorated in front of an ultraviolet source.
7. A method as claimed in claim 5, characterised by passing the surface to be decorated in front of heating panels.
8. A method as claimed in claim 5, characterised by passing the surface
10 to be decorated in front of heat lamps.
9. A method as claimed in claim 1, characterised in that a suspension of powdered coating material in a slow-drying liquid is applied to the surface already treated with powdered coating material and already subjected to heating.
- 15 10. A method as claimed in claim 9, characterised in that the slow-drying liquid is an acrylic compound.
11. A method as claimed in claim 9, characterised by using a suspension of powdered coating material in a slowly evaporating liquid.
12. A method as claimed in claim 1, characterised in that a coating
20 material in the form of dry powder is applied to the surface already treated with powdered coating material and already subjected to heating.
13. A method as claimed in claim 12, characterised by applying to the surface a uniform layer of powdered coating material and then removing a part

of this latter, so that the remaining part forms the required decoration.

14. A method as claimed in claim 13, characterised by removing, by suction, part of the powder previously deposited on the surface to be decorated.

5 15. A method as claimed in claim 13, characterised by removing, by wiping, part of the powder previously deposited on the surface to be decorated.

16. A method as claimed in claim 15, characterised in that the wiping is effected under moist conditions.

10 17. A method as claimed in claim 15, characterised in that the removal of the powder by wiping is effected with a manually operated tool.

18. A method as claimed in claim 15, characterised in that the removal of the powder by wiping is effected with a mechanically operated tool.

15 19. A method as claimed in claim 13, characterised by applying the powdered coating material using a silkscreen stencil reproducing the pattern of the desired decorations.

20. A method as claimed in claim 1, characterised by using powdered coating materials in the form of polyester resins.

20 21. A method as claimed in claim 1, characterised by using powdered coating materials in the form of epoxy resins.

22. A method as claimed in claim 1, characterised by using powdered coating materials in the form of epoxypolyester resins.

23. A method as claimed in claim 1, characterised by using powdered

coating materials in the form of polyester-hydroxyalkylamide resins.

24. A method as claimed in claim 1, characterised by using powdered coating materials in the form of polyurethane resins.

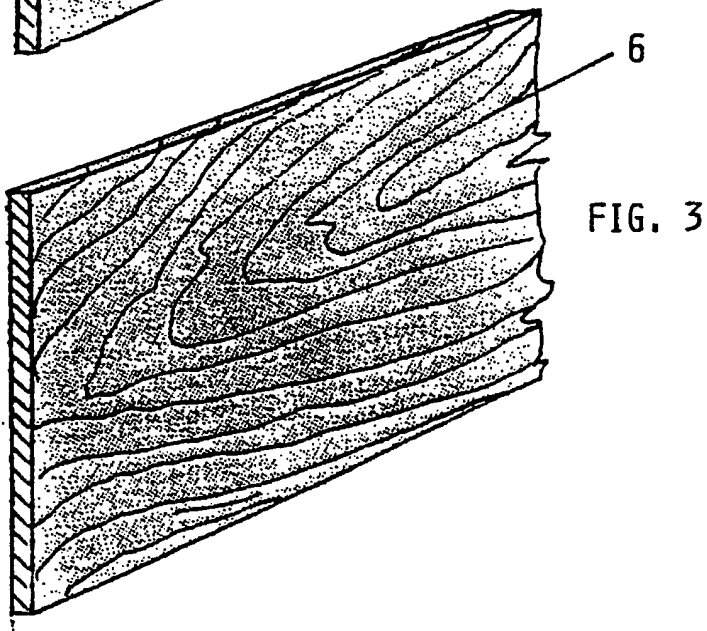
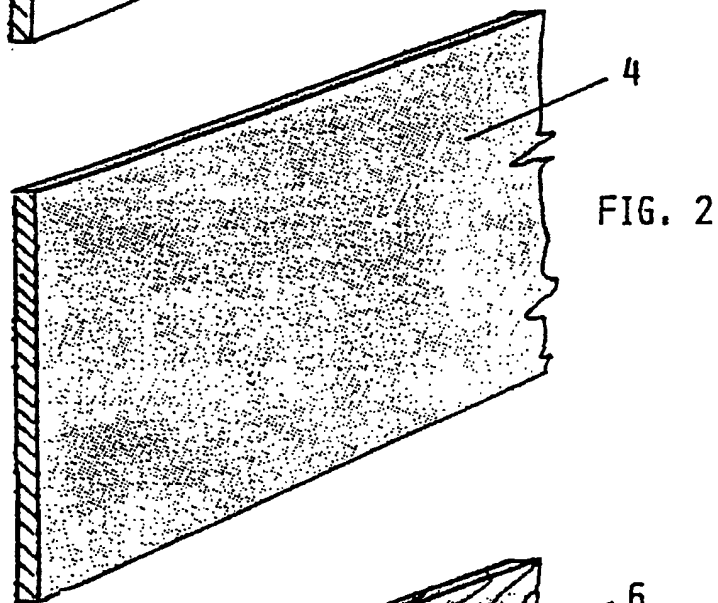
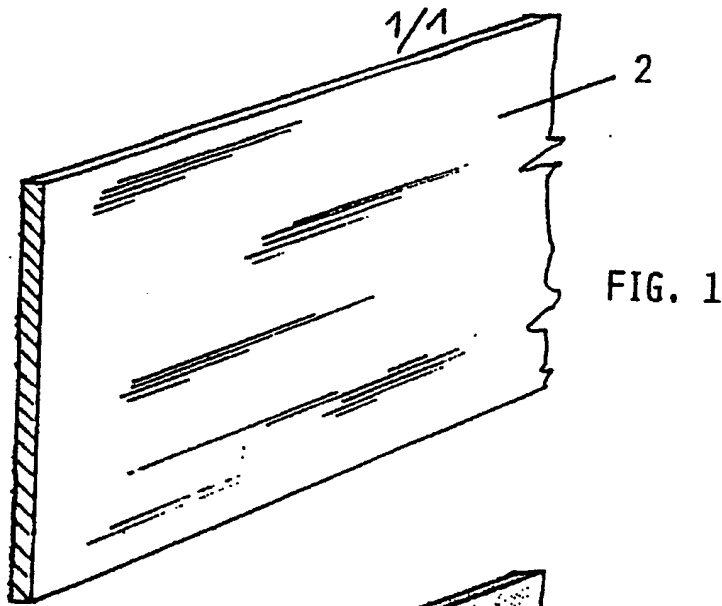
25. A method as claimed in claim 1, characterised by using powdered
5 coating materials in the form of acrylic resins.

26. A method as claimed in claim 1, characterised by using powdered coating materials in the form of epoxyacrylic resins.

27. A method as claimed in claim 1, characterised by using powdered coating materials in the form of acrylo-polyurethane resins.

10 28. A method as claimed in claim 1, characterised by using powdered coating materials in the form of acrylopolyester resins.

29. A method as claimed in claim 1, characterised by subjecting the surface to be treated to final baking at a temperature of 170-190°C for a time of 15-25 minutes.



INTERNATIONAL SEARCH REPORT

PCT/EP 96/03264

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B05D5/06 B44F9/04 B44F9/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B05D B44F

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